

PARTS OBSOLESCENCE WORKSHOP:

Impact of Commercialization on Parts Obsolescence

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Redstone Arsenal

A Semiconductor Perspective on Obsolescence

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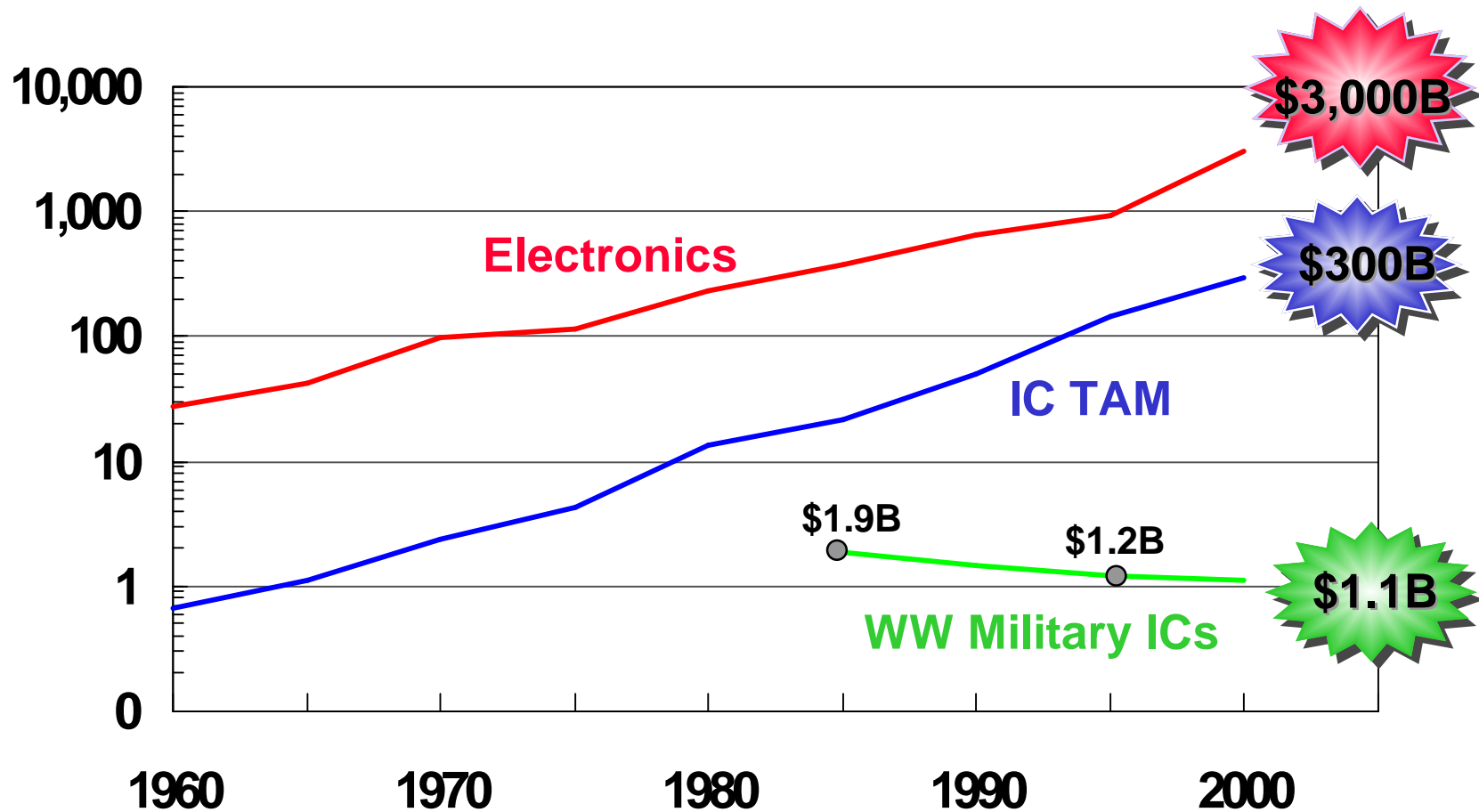
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Market Perspective



IC Supplier's View of Commercialization

Includes

- Standardization - Supplier's P/N or Industry Standard SMD #
- Market Driven, Value Based Pricing
- Plastic & Ceramic
- Distribution Availability: Off-the-Shelf
- Electrical Performance, Quality and Reliability driven by intended market and application
- Various Temperature Ranges: Comm, Ind, Auto, Mil
- Allocation When Demand Exceeds Supply
- Market Driven Support Infrastructure
 - Application Support
 - Technical Data
- Obsolescence

Does Not Include

- Freedom from Parts Obsolescence
- P.O. with User P/N
- Spec review: General or Device
- Cost or Pricing/SF1411/SF1412
- Certifications
- FAR/DAR Regulation
- Rated Orders
- ADA Language Compilers/Tools
- ITAR Export Restrictions/License
- Classified Programs
- Change Control & data Retention
- Using Parts Beyond Data Sheet
- Access to Supplier Intellectual Property
- Warranty on Non-Recommended Uses

TI View of Perry Directive

- Perry did not say you must use Commercial Grade Parts.
- Perry did not say to use parts outside the manufacturer's spec.
- Perry did not recommend “uprating” by inference from statistically invalid or inappropriate data obtained with the intent of circumventing the manufacturer's spec.
- Perry did not recommend “upgrading” by third party test labs.
- Use performance based specs.
- Use Mil Specs & Standards when commercial doesn't exist or doesn't meet the total need.

Some TI Facts

	<u>1996 Actual EOL</u>		<u>1997 Est. EOL</u>	
	<u>Com</u>	<u>Mil</u>	<u>Com</u>	<u>Mil</u>
DSP/uP/uC	41	3	116	15
Logic	11	4	202	7
Memory	7	4	16	2
Analog/Mixed Signal	<u>111</u>	<u>13</u>	<u>65</u>	<u>0</u>
Total Catalog	170	24	399	24
ASIC	<u>725</u>	<u>113</u>	<u>125</u>	<u>0</u>
TI Total	895	137	524	24

- Fab conversions caused EOL on ASIC above 0.8 micron in 1996.
- Mil 64K & 256K memory discontinued in 96, commercial EOL 10 yrs ago.
- Many of Mil DSP/uP/uC projected for 97 EOL are sourced from die banks; commercial EOL occurred years ago.
- Commercial Notice is letter to direct customers buying within 2 years; 3 months order entry, 3 month delivery window.
- Military notice is registered letter to direct customers buying within 5 years, GIDEP, Web, order entry is 6 months, delivery typically 6 month but negotiable depending on situation.
- TI does not assume responsibility for notifying distribution customers.

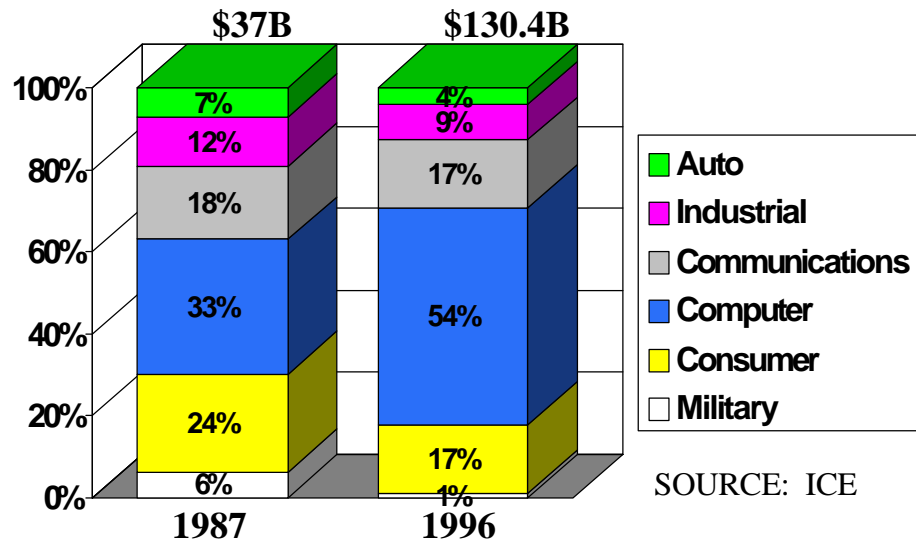
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Obsolescence Drivers

WW SC Consumption



Equipment Life Cycles

Market	Concept to Production	Produced	Product Life
Computer	3<---6 Months	3<---9 Months	3 - 8 Years
Consumer	6<---18 Months	3<---12 Months	3 - 8 Years
Automotive	2 - 3 Mod. Yr.	1 Mod. Yr.	7 - 10 Years
Defense	3 - 8 Years	0 - 20+ Years	>20 Years

Technology

- Memory **4M** - **16M** - **64M**
- ASIC #Gates / Feature Size
- Wafer Diameter
- Basic Process Volume
- Package

Market Demand

- Equipment Life Cycles
- Volume
- Speed / Functionality
- Value / Cost

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Recommended Alternatives

Pure Commercial **Where It Meets Total Need**

Pro's

- + Broad Selection
- + Lowest Initial Cost
- + Q&R Adequate for intended market/application

Con's

- More DMS plus little/no notice
- Nothing special
- No mfg support for out of spec use/screening
- Change info/data availability
- Technology Cost
 - ROM coded DSP = 5ku/12 mo
 - cDSP = \$10M/24mo.
 - ASIC = \$50M/24mo./5dsn
- Storage/Moisture Concerns
 - Tape/Reel = No bake
- EOL is not flexible!
- Surprise's!
- No support for audit of Fab's or A/T sites

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QML **Where Commercial Doesn't Fit**

Pro's

- + Performance fully characterized/tested
- + Environmental performance options
- + DMS sensitivity
 - More notice
 - Some flexibility
 - Alternatives
- + Support Infrastructure
 - Change information
 - Technical data
 - Applications Support
- + Technology Access
 - ROM coded DSP = \$30K NRE/500 units
 - cDSP = \$5M revenue/life
 - ASIC = \$500K/DSN/36 mo.
- + Audit by DSCC/ISO/Others

Con's

- Higher initial cost
- Less selection
- Less sources

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Alternatives Not Recommended

Use Beyond Manufacturer's Data Sheet

- No supplier can approve
 - Fundamental safety & liability issue
- User assumes full liability
- Supplier would testify against user if issue developed
- Dependent on electrical and environmental capabilities that can vary widely due to:
 - Wafer Fab
 - Owned, Joint Venture, Foundry
 - Assembly/Test Sites
 - Owned, Subcontracted
 - Equipment & Material Variations

Every part will undergo a fab move or wafer diameter change or electrical design change or shrink or package materials/process change or any combination within 3 years. Manufacturers only support data sheet and intended market requirements.

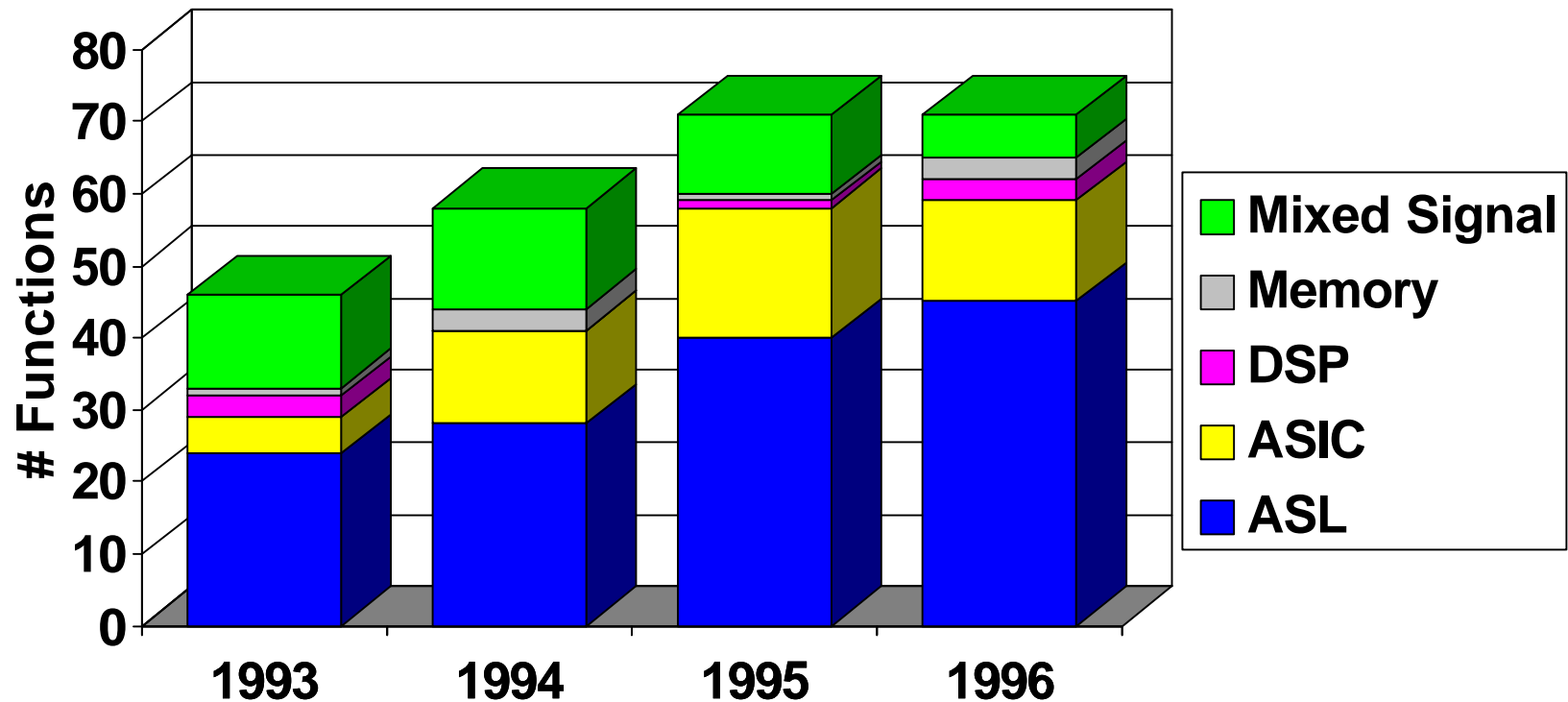
Upgrading/Upgrading/Specials

- Upgrading always degrades reliability
- User owns process & results
- IC makers don't share test program IP
- Commercial process stability; yield loss
 - Performance tweaks - no data sheet impact
 - Yield tweaks
 - Cost shrinks
 - Wafer diameter change
 - Die size shrinks
- Typical upgrade insertion causes 0.5% fallout for ESD/EOS plus unknown ESD walking wounded
- Burn-in = Don't do it!
- Product capability balanced against market requirements and cost
- No vendor to vendor commonality in process or materials
- Who gets ITAR license?

Things to Think About

- Some of the exact same parts some plastic proponents are citing as giving adequate or superior electrical performance without upgrading are shipped to the computer and distribution market with a single high temp (70 degrees C) test. These same parts must receive 100% high and low temp testing to pass automotive acceptance.
- Computer, consumer and much of the communications market are not concerned about performance beyond 0/70C nor moisture or temp cycle effects. They are obsessed with cost and performance related to data thru put. If an extra capability impacts cost it may disappear.
- 5V Technology has peaked, 3V here now, 2.5V and 1V coming! This will be serious future DMS problem.
- Who has good environmental capability data on 0.18 micron features?
- If today's \$1.2B converts totally to commercial by year 2002 it will represent less than 0.1% of WW IC TAM dollars/units. What influence or support will this drive?
- Will Military distributors exist if the TAM converts?
- Military & Aerospace users need to determine what other than low price they need and then proactively work with the QML suppliers to accomplish.

New QML Product Introductions



Key Introductions: 250 New Parts in Last 4 Years

DSP - 320C80

Logic - AHC Family

Mixed Signal - 1394 Chipset

Memory - 16M DRAM & SDRAM

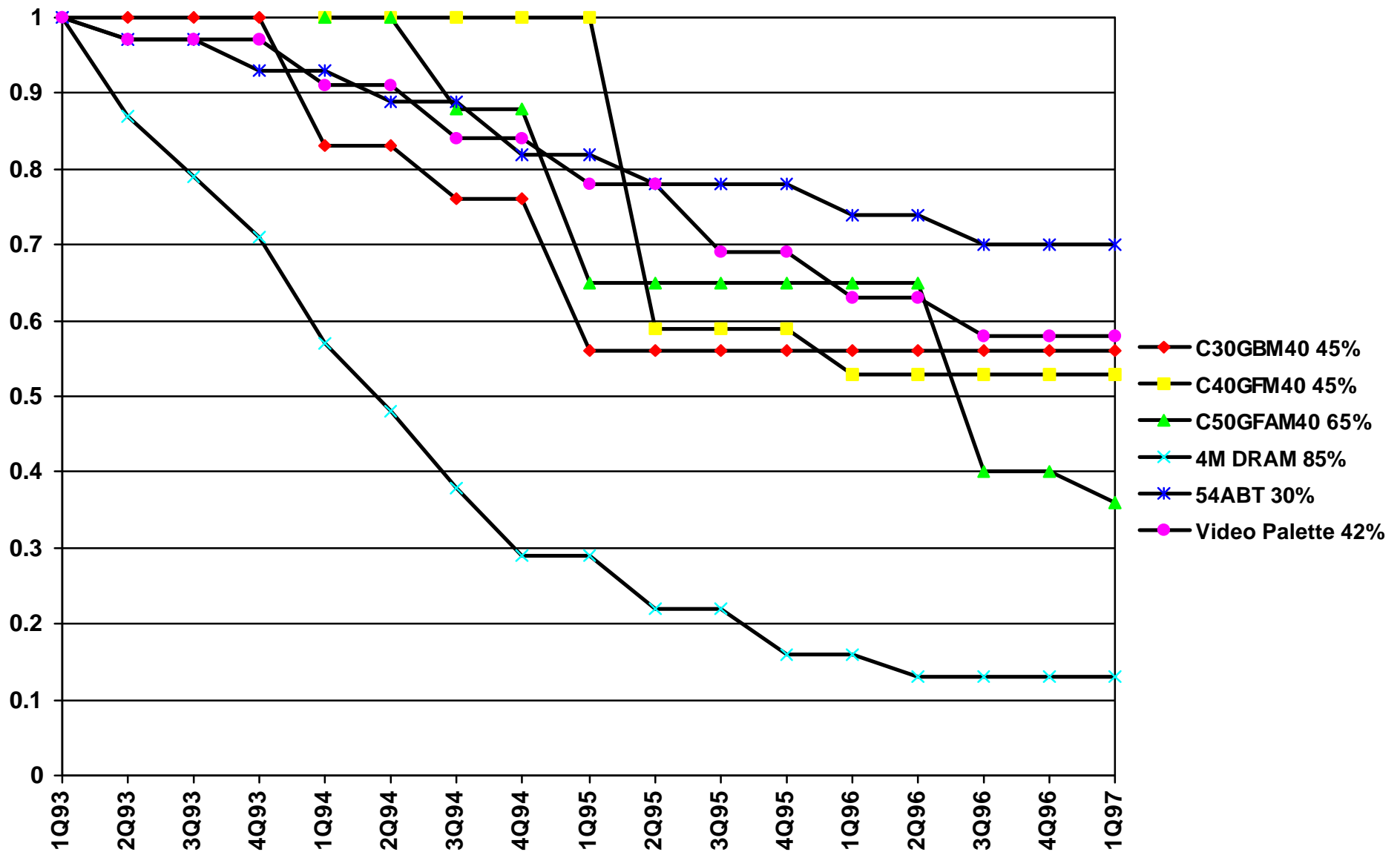
(Note: A function is independent of the number of package or speed options)

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QML PRICE HISTORY



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Conclusions/Recommendations

- DMS is not a ceramic vs plastic issue; it is an industry issue caused by the dynamics of the semiconductor market.
- QML parts will stay around longer
 - Selections have broad appeal ---> more volume - more life
 - More alternatives exist to extend life
- Make QML parts/suppliers your first choice.
- Use commercial plastic where it totally meets the need “as received”
- Don’t use parts beyond spec
- Give your process the “Wall Street Journal” test.